

He did not think that all such determinations rest upon the application of observed coincidences of structure, for which coincidences no reason can be rendered; for, although in many instances of this law of correlation, as demonstrated by comparative anatomy, the sufficient or physiological cause of them is not known; yet, in other instances, the application of the principle has been successfully illustrated. The truth or fact (said Prof. Owen) of a physiological knowledge of a correlated structure, and of the application of that knowledge to palæontology, is not affected or destroyed by instances adduced from that much more extensive series of correlated structures of which the physiological condition is not yet known.—*Proc. Geol. Soc.* Nov. 5, 1856.

*Note on Estheria minuta.* By T. RUPERT JONES, Esq.,  
Assist. Sec. G.S.

Not long since the Rev. W. Symonds favoured me with some well-preserved specimens of this little Triassic fossil; and, with Prof. J. Quekett's kind assistance, I was enabled to see most distinctly the true Crustacean character of the tissue of its valves. This confirmed an opinion I had long held that this fossil is not a Mollusk, but closely allied to the *Limnadia*, *Limnetis*, and *Estheria*\*, bivalved phyllopodous Crustaceans (*Entomostraca*) of the present day; and indeed, as far as the carapace-valves are concerned, it well represents the *Estheria* of Rüppell and Baird† (*Isaura*, Joly).

In the Quart. Journ. Geol. Soc. (1847) vol. iii. p. 274, Sir C. Lyell figured a similar fossil from the coal-shales of Eastern Virginia, and remarked that, with Mr. Morris, he doubted whether the so-called "*Posidonomya*" may not be a Crustacean rather than a Mollusk‡. Similar fossils, of different species, occur in the Devonian rocks (Caithness and Orkney), Carboniferous (Northumberland), Liassic (Skye and Gloucestershire), Oolitic (Scarborough), Purbeck (Dorset), and Wealden (Sussex). Others are met with in the Jurassic Coal-fields of North Carolina and Virginia§, and along their north-eastern extension, forming the so-called "New Red Sandstone" of Virginia and Pennsylvania||; in the plant-bearing sandstones of Central India¶ (Nagpur and Mangali); and in the Triassic deposits of Europe.

\* This is the little Triassic shell that has been termed *Posidonia* and *Posidonomya minuta*: *Posidonia minuta*, (Alberti) Goldfuss, Petref. Germ. p. 118. t. 113. f. 5; *Posidonomya minuta*, Bronn, Leth. Geog. p. 164. t. 11. f. 22; Zieten, Verst. Württemb. p. 72. t. 54. f. 5; Strickland, Geol. Trans. 2 ser. vol. v. p. 338. t. 28. f. 4. In Morris's 'Catalogue of British Fossils,' 2nd edit. 1854, it is included in the *Crustacea* (as *Estheria minuta*); but (apparently from inadvertence) it has not been expunged from the list of Mollusks in that work.

† Proc. Zool. Soc. part 17. p. 86.

‡ See also Lyell's 'Manual of Geology,' 5th edit. p. 332.

§ Lyell, *loc. cit.*; and W. B. Rogers, Boston Nat. Hist. Soc. Proc. v. p. 15.

|| Continuous with the Sandstones of New Jersey, and most probably with those of Connecticut also: Rogers, *loc. cit.*

¶ Quart. Journ. Geol. Soc. vol. xi. p. 370.

Although occurring so constantly in the different geological periods, from the Devonian to the Wealden\*, and again in the recent marine and fresh waters, yet it is in the Triassic deposits of England and the Continent, in the sandstones and shales of Virginia and Pennsylvania, and in the plant-bearing beds of Virginia and Central India, that this little bivalved Entomostracan appears to be pre-eminently abundant; so as to serve probably as a faithful index of a peculiar geological horizon†.

In like manner, among the still lower forms of life, the Nummulate is represented in the Silurian‡, Carboniferous, Liassic, and Oolitic rocks, and exists also at the present day; but it particularly distinguished one epoch (the Tertiary) by a surprising fecundity and a temporary profusion of individuals.

The occurrence of a fossil *Estheria* in the Upper Sandstone and Shale of the Scarborough district (*E. concentrica*, Bean§, sp.) is of interest, as being indicative of the association of this Crustacean with the Oolitic flora in England, as it is in India and America.

In India a Triassic Labyrinthodont Reptile (*Brachiops laticeps*||) is found in the same strata as yield the *Estheria* at Mangali and the plants at Nagpur; and in Pennsylvania reptilian remains¶ occur with the so-called "Posidonia": in America indeed the evidence seems to point to a contemporaneity of the Virginian plant-beds, the shales and sandstones of Pennsylvania and New Jersey, the foot-marked sandstones of Connecticut, and the upper red sandstone of Nova Scotia and Prince Edward's Island, which is also reptiliferous\*\* ; and it is evident that in the Virginian and Pennsylvanian shales the minute Crustaceans under notice are important fossils. The plants of Nagpur and Virginia having a Jurassic facies, like those of Scarborough, it will be interesting, as further evidences turn up, to see how far we are to regard the Triassic or the Jurassic element as preponderating, or whether a passage-group of deposits are indicated by the evidence,—or, lastly, whether these Plant-beds with Reptiles and Crustaceans indicate the terrestrial and lacustrine conditions only of the early secondary period.

The Jurassic flora of Australia†† and that of Southern Africa have been hitherto collected without affording any clear traces of the *Estheria*. The latter country, however, has its probably Triassic

\* I have no satisfactory evidence of the presence of the genus in question in the Cretaceous and Tertiary deposits.

† Prof. W. B. Rogers has already pointed out (*loc. cit.*) the probable value of this little fossil in the comparison of the Mesozoic rocks of North Carolina and Virginia, and of these with the so-called Triassic beds of the United States.

‡ Annals and Mag. Nat. Hist. ser. 2. vol. xv. p. 58.

§ Mag. Nat. Hist. ix. p. 376.

|| Quart. Journ. Geol. Soc. vol. ix. p. 37 & 371.

¶ Lea on *Clepsysaurus Pennsylvanicus*, Journ. Acad. N. Sc. Philad. n. s. vol. ii. p. 185; and on *Centemodon sulcatus*, Proc. Ac. N. Sc. Philad. vol. viii. p. 77.

\*\* Leidy on *Bathynathus borealis*, Journ. Acad. N. Sc. Philad. n. s. vol. ii. p. 327.

†† See M'Coy's paper, Annals and Mag. Nat. Hist. vol. xx. p. 145, &c.

Reptile, the *Dicynodon*, imbedded with this flora\*;—so that the peculiar association above-indicated for India and North America obtains there also.

In pointing out these facts of the geological and geographical distribution of the fossil *Estheria*, I merely touch upon the salient points of an interesting subject of research,—for the elucidation of which careful inquiry at home and abroad is still requisite.

In conclusion, although the recent *Estheria* is a marine Crustacean, yet, since very closely allied forms are of freshwater habits, and since among bivalved Entomostracans different species of a genus and even the individuals of a species occasionally live either in marine or in fresh water, there is no *certain* evidence afforded by the fossil in question whether the so-called Triassic deposits in which it is found were formed in rivers, lakes, or seas.—*Journal of the Geological Society* for November 1856.

*On the Genus Cuma.* By C. SPENCE BATE, F.L.S.

The study of the *Diastylidæ* certainly led in my mind to a very different conclusion from that which, judging from the remarks in the September Number of Silliman's Journal, it has produced in Prof. Agassiz'. I think, moreover, that since he admits the *Diastylis Rathkii* to be an adult animal, because it has been taken with young, he must have overlooked Mr. Goodsir's statement, that he had taken *Cuma Scorpoides*† (Mont.) *with spawn* (ova), which he describes as very large and of a bright straw colour. This appears to be an argument of equal force to prove that *Cuma* is adult.

In my humble judgment, the fact of Prof. Agassiz having taken his specimens from *Macroura*, is evidence that they could not be *Cumæ*—that is, the genus of Edwards and Goodsir.

With regard to the affinity between the young of *Macroura* and *Cuma*, I append a portion of an interesting letter which I received from R. Q. Couch, Esq., whose knowledge of the larval forms of the decapod Crustacea is second to no living carcinologist. I have taken the liberty to italicise one passage:—

“Penzance, August 11th, 1856.

“I have been very much occupied on the larval state of our decapod Crustaceans, in furtherance of a re-examination of the whole subject. It cannot be a matter of surprise that the genera *Cuma*, *Alauna*, *Bodotria*, &c. should *à priori* be thought to be the young of the higher Crustacea. I confess I suspected it myself for some time, but gave it up many months ago, and my opinions are fully confirmed by the valuable observations in your paper. My views were grounded on the fact, that *I never met with any of these forms*

\* Trans. Geol. Soc. 2nd series, vol. vii. part 4. p. 227, note.

† It must be remembered that in the species *Cuma Scorpoides* of Montagu, I have included the *C. Audouinii* of Edwards and the *C. Edwardsii* of Goodsir.